Before the
FEDERAL COMMUNICATIONS COMMISSSION
Washington, D.C. 20554

In the Matter of	)	
	)	WT Docket No. 02-08
Reallocation of the 216-220 MHz,	)	RM-9267
1390-1395 MHz, 1427-1429 MHz,	)	RM-9692
1429-1432 MHz, 1432-1435 MHz,	)	RM-9797
1670-1675 MHz, and 2385-2390 MHz	)	RM-9854
Government Transfer Bands	)	RM-9882

To: The Commission

COMMENTS OF ARRAYCOMM, INC.

Danny E. Adams
Paul G. Madison
Joan M. Griffin
Stephanie A. Joyce
KELLEY DRYE & WARREN LLP
1200 19th Street, N.W., 5th Floor
Washington, DC 20036
Telephone: (202) 955-9600
Facsimile: (202) 955-9792

Attorneys for ArrayComm, Inc.

Bradley P. Holmes
Senior VP, Regulatory and Government Affairs

Randall Coleman
VP, Regulatory Affairs

Marc Goldburg
CTO, Internet Products Group

ARRAYCOMM, INC.
888 Sixteenth Street, N.W., Suite 700
Washington, D.C. 20006

Leonard S. Kolsky
LUKAS NACE GUTIERREZ & SACHS
1111 19th Street, N.W.
Washington, D.C. 20036
Of Counsel

Date: March 4, 2002

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SUMMARY

ArrayComm, Inc. ("ArrayComm"), by its attorneys, hereby submits these Comments in response to the Notice of Proposed Rulemaking in WT Docket No. 02-08. ArrayComm congratulates the Commission for its efficiency in releasing the *Reallocation NPRM*. ArrayComm is a Silicon Valley-based technology house with plans to introduce innovative new technology, *i-BURST*™, that will bring consumers wireless broadband Internet access. ArrayComm's technology includes a wide-area portable broadband Internet solution and an IP-optimized radio interface. This state-of-the-art technology is based upon ArrayComm's IntelliCell® technology, currently deployed in over 90,000 base stations in Japan, China and Taiwan, and delivers as much as 1 megabit per second ("Mbps") of throughput to each end user, with 20 Mbps of aggregate per-cell throughput in 5 MHz.

ArrayComm strongly supports the majority of the Commission's tentative conclusions and proposals for the 1670-1675 MHz band because the proposed regime would ensure the efficient and complete use of the spectrum by allowing the licensee the maximum flexibility in its use. ArrayComm urges the Commission to adopt its proposed rules for authorizing the 1670-1675 MHz band in a single nationwide license. Nationwide licensing will encourage investment, provide consumers with ubiquitous service, and serve Congress's mandate in Section 309(j) of the Act that the Commission promote the deployment of innovative technologies using reallocated spectrum.

ArrayComm also supports the Commission's proposals to apply Part 27 of the Commission's Rules to the 1670-1675 MHz band. Application of Part 27, rather than the less flexible Part 101, will provide licensees of this spectrum a streamlined regulatory regime that will foster new entry and the provision of innovative services to end users.

The Commission has also correctly reasoned that licenses in the 1670-1675 MHz band should be granted as a 5MHz block. As the Commission has noted, not only is division of the 5 MHz block infeasible, it would render each sub-block financially unviable.

Band managers are unnecessary for the 1670-1675 MHz band and would likely hinder users' ability to achieve service ubiquity. The assignment of band managers would discourage new entry and the provision of innovative services, because it could result in the division of spectrum on a regional basis. Even if the Commission adopted service rules to restrict a band manager's administration of the spectrum, band managers would impose unnecessary complexity and could jeopardize service ubiquity such that they would not serve the public interest.

The Commission should adopt its proposed application, ownership and license term rules for the 1670-1675 MHz band. ArrayComm supports the Commission's tentative decision to permit both commercial and private use of this spectrum because permitting licensees the flexibility to choose the services that they deliver based on market opportunity will best encourage the efficient and complete use of this spectrum. The Commission should also provide broad applicant eligibility subject to Congress's clear foreign ownership restrictions in Section 310 of the Communications Act. Further, the Commission should adopt its proposed 10-year license term with a renewal expectancy contingent upon provision of substantial service because

such a renewal expectancy will provide a stable regulatory environment that will be attractive to investors, thereby encouraging new entry and investment in services on this band.

ArrayComm agrees that geographic partitioning and spectrum disaggregation are in the public interest and should be permitted in the 1670-1675 MHz band. ArrayComm believes that this proposal could serve the public interest, as it grants licensees further flexibility in the use of the spectrum, which is in keeping with the Commission's general goal in this band. ArrayComm emphasizes, however, that its foremost concern in this proceeding is that the Commission adopt the single nationwide licensing scheme proposed in the Reallocation Notice of Proposed Rulemaking. Nonetheless, ArrayComm acknowledges that partitioning and disaggregation of this spectrum may encourage the efficient use of this spectrum and is therefore in the public interest.

ArrayComm also recommends that the Commission forbear from applying historical Title II regulatory requirements on innovative services provided in the 1670-1675 MHz band. The nascent and highly specialized nature of the services to be provided over this spectrum requires little active Commission regulatory oversight.

The Commission should apply the substantial service test for reviewing licensee operating performance in the 1670-1675 MHz band. The substantial service test is the appropriate tool for this purpose, because, as is also true in the renewal expectancy context, it best ensures that the spectrum awarded by the Commission is in fact used to bring innovative services to end users.

ArrayComm supports the Commission's general proposal to apply its Part 27 rules to the 1670-1675 MHz band as described above. In the *Reallocation Notice of Proposed Rulemaking*, the Commission also proposed to apply certain technical provisions of Part 27 to this band. ArrayComm supports the application of those provisions with the following two exceptions. First, with regard to routine environmental evaluations, commercial operations in the 1670-1675 MHz band should be subject to the same trigger levels for such evaluations as Broadband PCS. Second, it is not clear that the provisions of Section 27.63 of the Commission's rules should apply to operations in the instant band. If the original motivation for these provisions is specific to WCS equipment operating at 2.3 GHz or 750 MHz, then the coordination requirements should not apply to operations in the 1670-1675 MHz band.

With respect to emissions limits, ArrayComm proposes that in-band emissions limits be specified in consideration of RF safety and coordination at the license boundary, while out-of-band emissions limits be independently specified in consideration of the protection requirements of adjacent band systems. This approach will result in maximum flexibility for commercial operations in the band, while guaranteeing protection of adjacent band services. It will allow operators to determine the tools that they will use in meeting adjacent-band protection requirements without restricting their in-band prerogatives. The sensitivities of adjacent band radiosonde and radioastronomy operations are so extreme, however, that site-by-site protection requirements must be adopted to protect them. No commercially reasonable general out-of-band emissions limit, *e.g.*, as used to protect Broadband PCS systems from one another, will protect radiosonde and radioastronomy operations. As importantly, the Commission must specify which

sites for these services are to be protected, or at least with whom the operator must coordinate, and to what level.

ArrayComm proposes in-band emissions limits of 2 kW EIRP for fixed stations and 4 W EIRP for mobile stations, midway between the emissions limits of the Broadband PCS and WCS rules. ArrayComm's proposal for general out-of-band emissions limitations is the "$43+10\log_{10}P-10\log_{10}M$" criterion that the Commission proposes in the Notice of Proposed Rulemaking. This is the same criterion adopted in the Broadband PCS and WCS rules, revised to account for the behavior of adaptive antenna systems.

The Commission seeks comment on its interim proposal to adopt the same in-band emissions requirements at the Mexican and Canadian borders with the United States as it does for borders between geographic service areas. Assuming that a field strength limit is adopted, ArrayComm supports this proposal. With regard to coordination with incumbent government operations, as the Commission noted, site-by-site coordination for spectrum licensed on a geographic area basis would be neither efficient nor feasible. For that reason, subject to the appropriate predefined coordination procedures, geographic area licensees should be responsible for determining whether a change to their deployment necessitates a coordination procedure. To that end ArrayComm asks that the Commission identify, well in advance of the auction, the entities with whom licensees must coordinate, in order that participants may understand the parameters under which their service must work.

Finally, the Commission should adopt its proposed bidding credits for small business applicants in the 1670-1675 MHz band because those credits will ensure that new companies have a meaningful opportunity to compete for licenses in the 1670-1675 MHz band. Although ArrayComm strongly supports the use of spectrum for public safety purposes, these applications are not subject to competitive bidding under Section 1.2101(b) of the Commission's rules.

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To: The Commission

COMMENTS OF ARRAYCOMM, INC.

ArrayComm, Inc. ("ArrayComm"), by its attorneys, hereby submits these Comments in response to the Notice of Proposed Rulemaking in the above-captioned docket released by the Federal Communications Commission ("FCC" or "Commission") on February 6, 2002 ("*Reallocation NPRM*").[1] In support of these Comments, the following is respectfully shown:

I. Introduction

ArrayComm congratulates the Commission for its speed and efficiency in releasing the *Reallocation NPRM*. The Commission has completed the Herculean task of marshalling several blocks of spectrum, comprising 27 megahertz, in a single rulemaking proceeding only one month after authorizing this spectrum.[2] This effort epitomizes Congress's goal of encouraging "the

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[1] *Reallocation of the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands*, WT Docket No. 02-08, Notice of Proposed Rulemaking, FCC 02-15 (rel. Feb. 6, 2002). This notice was published in the Federal Register on February 15, 2002 at 67 FR 7113.

[2] *Reallocation of the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands*, ET Docket No. 00-221, RM-9267, RM-9692, RM-9797, RM-9854, Report and Order and Memorandum Opinion and Order, FCC 01-382 (rel. Jan. 2, 2002) ("*Reallocation Order*").

most efficient use" of spectrum in order to spur "rapid deployment" of innovative wireless services.[3]

A. Scope of ArrayComm's Comments

Although these Comments may have general applicability to the entire proceeding, ArrayComm's interest in this proceeding lies with the 1670-1675 MHz band allocation. As such, ArrayComm's focus in these Comments relates exclusively to the rules that would be applicable to the 1670-1675 MHz band.

B. About ArrayComm

ArrayComm is a small, Silicon Valley-based technology house with plans to introduce innovative new technology into the wireless industry that will benefit consumers wishing to gain access to broadband Internet services. ArrayComm participated in the Commission's consideration of the allocation of the 1670-1675 MHz unpaired band seeking the efficient and timely allocation of this spectrum.[4] ArrayComm anticipates applying for the 1670-1675 MHz license because this spectrum band is well suited for its *i-BURST*™ wireless Internet service.

i-BURST is a wide-area portable broadband Internet solution that combines the spectral efficiency of ArrayComm's IntelliCell® technology with an IP-optimized radio interface and a unique IP-centric architecture. IntelliCell is a state-of-the-art adaptive, or "smart," antenna technology. IntelliCell is currently deployed in over 90,000 base stations for a variety of air interfaces in countries including Japan, China and Taiwan.

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3 *Omnibus Budget Reconciliation Act*, H.R. Rep. No. 103-111, 103rd Congress, 1st Sess. at 576, 573 (1993) ("*House Report*").

4 ET Docket No. 00-221, RM-9267, RM-9692, RM-9797, RM-9854, Comments of ArrayComm, Inc. (filed Mar. 8, 2001) ("ArrayComm ET 00-221 Comments"); Reply Comments of ArrayComm, Inc. (filed Apr. 6, 2001) ("ArrayComm ET 00-221 Reply Comments").

i-BURST enables large-scale, high-speed wireless Internet networks to be deployed and maintained at significantly lower cost than today's cellular data solutions and the 3G solutions anticipated in the future. *i-BURST* has been optimized to operate over one or more unpaired bands of radio spectrum using time division duplexing ("TDD") transmission technology and delivers as much as 1 megabit per second ("Mbps") of throughput to each end user, with 20 Mbps of aggregate per-cell throughput in 5 MHz.

C. ArrayComm Strongly Supports the Commission's Tentative Conclusion to Issue a Nationwide License in the 1670-1675 MHz Band

ArrayComm strongly supports almost all of the Commission's tentative conclusions and proposals for 1670-1675 MHz band. The Commission's proposed regulatory regime would ensure the most efficient and complete use of spectrum, because it allows the licensee the maximum flexibility in its use. ArrayComm believes that the *Reallocation NPRM* strikes a necessary and appropriate balance between Commission oversight and carrier flexibility that will result in the efficient use of the 1670-1675 MHz band as Congress intended.

ArrayComm urges the Commission to adopt its proposed rules with respect to authorizing the 1670-1675 MHz band in a single nationwide license. A single nationwide license is pivotal to ArrayComm's intended use of the spectrum. In addition, others indicating their interest in this band have also requested that the Commission authorize the spectrum on a single-block nationwide basis.

ArrayComm supports the Commission's proposals to apply Part 27 to the 1670-1675 MHz band, to allow the flexible use of spectrum for commercial and private services, and to provide broad applicant eligibility. ArrayComm does not, however, support the concept of a band manager in the 1670-1675 MHz band because that construct is unnecessary for a single nationwide license. Moreover, ArrayComm and others, having invested in the development of

new and innovative technology, may find it difficult to implement their networks and services under a band manager. For example, the investment community may be reluctant to invest in providers when the license necessary to provide services is held by a third party with investors that have business goals of their own, or if the band manager is not technology neutral.

ArrayComm also supports the Commission's tentative conclusion to forbear from regulating 1670-1675 MHz licensees, as it has done for other CMRS licenses, but urges the Commission to go further in adopting full forbearance of Title II regulations in this band.

Finally, ArrayComm urges the Commission to adopt technical rules that will permit maximum flexibility to operators in this band while ensuring adequate protection against harmful emissions. Specifically, the Commission should determine in-band emissions in consideration of RF safety and coordination at license boundaries, while out-of-band emissions limits should be independently specified in consideration of the protection requirements of adjacent band systems. This approach will allow operators to determine the tools that they will use in meeting adjacent-band protection requirements without restricting their in-band prerogatives. In addition, as to coordination, the Commission should identify all entities given protected status as soon as possible, in order that applicants can properly assess their ability to provide service in this band.

II. The Commission Should Adopt Its Proposed Licensing Plan For The 1670-1675 MHz Band

A. Application of the More Flexible Part 27 Rules Will Foster the Commission's Goal of Encouraging Innovative Services in the 1670-1675 MHz Band

The Commission seeks comment on whether its Part 27 rules should apply to the bidding and licensing procedures for the 1670-1675 MHz band.[5] ArrayComm believes that application of Part 27 will provide licensees of this spectrum a streamlined regulatory regime that will foster

[5] *Reallocation NPRM* ¶¶ 16-18.

new entry and the provision of innovative services to end users. ArrayComm therefore recommends that the Commission apply Part 27, rather than the less flexible Part 101, to the 1670-1675 MHz band.

Part 27 was established in 1997 pursuant to Congress's grant of authority to the Commission in Section 303 of the Act[6] to permit flexible use of spectrum.[7] Section 303, as the Commission has explained, permits flexible use of spectrum where such use is in the public interest, would not deter investment in services, and would not cause harmful interference to other spectrum users.[8] In the *Part 27 Order*, the Commission recognized that streamlined licensing requirements were appropriate for new spectrum in order to provide the most efficient, most expeditious use of that spectrum.[9]

That approach is fully warranted here. The services that ArrayComm and others seek to provide over the 1670-1675 MHz band are innovative and will provide an important competitive choice in services – notably Internet access services – in keeping with the Commission's goal of deriving maximum value from the public radio spectrum. As such, this band does not require the more extensive regulatory oversight that Part 101 provides. Rather, the Commission should choose to apply its Part 27 regime, which will impose a significantly lower regulatory burden on the new entrants that seek to use the 1670-1675 MHz while providing maximum flexibility of service.

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6 47 U.S.C. § 303, as amended by the Omnibus Consolidated Appropriations Act, Pub. L. No. 104-208, 110 Stat. 3009 (1996).

7 *Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service*, GN Docket No. 96-228, Report and Order, FCC 97-250, 12 FCC Rcd. 10785 (1997) (allocating spectrum at 2305-2310 MHz, 2310-2320 MHz and 2345-2360 MHz for fixed, mobile, radiolocation and broadcasting-satellite (DARS) services) ("*Part 27 Order*").

8 *See* 47 U.S.C. § 303(y)(2).

9 *Part 27 Order*, 12 FCC Rcd at 10789.

B. The Commission is Correct That a Nationwide Geographic License in the 1670-1675 MHz Band Is Crucial for Ubiquitous Provision of Innovative Wireless Services

The Commission has tentatively concluded that the license in the 1670-1675 MHz band should be granted on a nationwide basis.[10] ArrayComm strongly supports this conclusion, as it has consistently explained that nationwide licensing will encourage investment,[11] provide consumers with ubiquitous service, and is necessary to comport with Congress's mandate in Section 309(j) of the Act that the Commission promote the deployment of innovative technologies using reallocated spectrum.[12]

Nationwide licenses are particularly necessary for the services proposed for the 1670-1675 MHz band. Indeed, as the Commission notes, the three parties providing comment on reallocation of this spectrum all agree that nationwide licensing is in the public interest.[13] This unanimity is not mere coincidence.

As the Commission has recognized,[14] nationwide licenses are crucial to the financial viability of providers who wish to deploy new and innovative services, and this is particularly true in the 1670-1675 MHz band. Specifically, as explained in the February 2001 study by John Haring and Jeffrey H. Rohlfs,[15] submitted by ArrayComm earlier in the allocation proceeding, the economic demands of launching service at 1670-1675 MHz, coupled with the market realities

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10 *Reallocation NPRM* ¶ 33.

11 ArrayComm ET 00-221 Comments at 50.

12 ET Docket No. 00-221, RM-9267, RM-9692, RM-9797, RM-9854, ArrayComm Supplemental Comments at 4-6 (filed July 13, 2001).

13 *Reallocation NPRM* ¶ 32 (citing ArrayComm ET 00-221 Comments at 50-51, AeroAstro ET 00-221 Comments at 7, MicroTrax ET 00-221 Comments at 12).

14 *Reallocation NPRM* ¶ 30.

15 John Haring and Jeffrey H. Rohlfs, *Economic Need for a National License in the 1670-1675 MHz Band* (Feb. 16, 2001) (attached to ArrayComm ET 00-221 Comments as Appendix A) (hereinafter "*Economic Need for a National License*").

of this early post-monopoly period, require that new entrants immediately obtain the ability to achieve service ubiquity. This study shows that the types of specialized services that commenters propose for this band require significant expenditure for equipment deployment, business development and advertising; "[f]or these reasons, regional (or *a fortiori*, local) licenses *may have virtually no value*[.]"[16]

Moreover, as stated in *Economic Need for a National License*, the "copycat" phenomenon of service duplication, as well as the constant threat of market leverage by regional incumbent local exchange carriers ("ILECs"), put a premium on a licensee's ability to claim nationwide ubiquity for its service.[17] As such, if ArrayComm or others seek to bring new and innovative services to the public utilizing the 1670-1675 MHz band, it is an absolute imperative that these new service providers be given the opportunity to deploy on a nationwide basis. For these reasons, ArrayComm supports the Commission's tentative conclusion that the licenses for the 1670-1675 MHz band be granted on a nationwide basis.

C. The Commission Has Correctly Reasoned That Licenses in the 1670-1675 MHz Band Should Be Granted as a 5 MHz Block

The Commission proposes in the *Reallocation NPRM* to license the 1670-1675 MHz band as a single 5 MHz block.[18] ArrayComm urges the Commission to adopt that proposal, for both technical and economic reasons. For, as the Commission has noted, not only is division of the 5 MHz block infeasible, it would render each sub-block financially unviable.[19] Indeed, the record overwhelmingly demonstrates that block licenses are crucial for this band.

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16 *Economic Need for a National License* at 2.

17 *Economic Need for a National License* at 3-6.

18 *Reallocation NPRM* ¶ 35.

19 *Id*.

As ArrayComm explained in its initial reallocation comments, a 5-MHz block is "close to the minimum amount" of spectrum that can support a viable new broadband service.[20] Subdivision of the band would not only reduce the frequency extent of each licensee's block, in all likelihood it would also necessitate the introduction of guardbands within each block to ensure coexistence, further reducing the useable spectrum available to the operator. Simply put, based on ArrayComm's understanding of the positions of the parties that have demonstrated an interest in the 1670-1675 MHz band, no party believes that band is viable unless it is licensed as a single block.

The only other commenters on the instant spectrum have indicated that their applications require 5 MHz for technical and economic viability.[21] Based on the record, therefore, subdividing the band would undoubtedly discourage the new entry and investment in this band that Congress intended to encourage. Therefore, the Commission should not divide the 1670-1675 MHz band into sub-blocks, but rather should license the spectrum as a single block in furtherance of the public interest.

D. Band Managers are Unnecessary for the 1670-1675 MHz Band and Could Hinder Users' Ability to Achieve Service Ubiquity

The *Reallocation NPRM* seeks comment on whether application of traditional band manager licensing policies to the 1670-1675 MHz band is appropriate.[22] ArrayComm believes that band managers are not only unnecessary, but also potentially counterproductive.[23] The Commission has stated its intent to provide nationwide licenses in this band in order to

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[20] ArrayComm ET 00-221 Comments at 49.

[21] AeroAstro ET 00-221 Comments at 6; MicroTrax ET 00-221 Comments at 25.

[22] *Reallocation NPRM* ¶ 40.

[23] ArrayComm is particularly concerned about the assignment of band managers to the extent that the manager might not be technology-neutral in terms of the type of services and equipment that sublicensees may use over the allotted spectrum.

encourage new entry and the provision of innovative services.[24] The assignment of band managers would run contrary to that intent, as it could well result in the division of spectrum on a regional basis. Even were the Commission to adopt service rules to restrict a band manager's administration of the spectrum,[25] band managers would impose unnecessary complexity and could jeopardize service ubiquity such that they would not serve the public interest.

The Commission has recognized that assignment of band managers is not always appropriate.[26] For example, band managers may cause additional interference, loss of spectrum efficiency and, as a result, decreased quality of service.[27] Moreover, reliance on band managers would likely result in the piecemeal sublicensing of 1670-1675 MHz band spectrum, militating against the nationwide footprint that the Commission seeks to achieve.[28] Applying such a scheme to the 1670-1675 MHz band would discourage the investment community from funding applicants and new licenses, because a third-party band manager, rather than the service provider, would actually hold the license.

In essence, band managers would add another layer of complexity to the licensing process, and could thwart service ubiquity, in a manner that would not encourage new entry or spawn innovative services. Band managers are appropriate and effective only for spectrum bands likely to be used by multiple service providers providing a variety of services. Under a nationwide licensing scheme, as both the Commission and commenters have proposed, there

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24 *Reallocation NPRM* ¶ 33.

25 *Reallocation NPRM* ¶ 39.

26 *Implementation of Sections 309(j) and 337 of the Communications Act of 1934 as Amended*, WT Docket No. 99-87, Report and Order and Further Notice of Proposed Rulemaking, FCC 00-403, 15 FCC Rcd. 22709, 22728 (2000) ("*BBA Report and Order*").

27 *BBA Report and Order*, 15 FCC Rcd. at 22733.

28 *See Reallocation NPRM* ¶ 33.

would be no need for a band manager. A single nationwide licensee in the 1670-1675 MHz band therefore does not require band management.

For these reasons, the assignment of band managers in the 1670-1675 MHz is not in the public interest.

III. The Commission Should Adopt Its Proposed Application, Ownership And License Term Rules For The 1670-1675 MHz Band

A. ArrayComm Supports the Commission's Tentative Decision to Permit Both Commercial and Private Use of this Spectrum

The Commission has tentatively concluded that the most efficient and administrable use of the 1670-1675 MHz band will occur if the licensee is permitted to operate on both a commercial (CMRS) and a private (PMRS) basis.[29] Under this regime, carriers could seek one or both of the CMRS and PMRS statuses for a single license, thus enabling them to serve a wide array of customers and avoiding the need to define their scope of service prior to becoming operational.[30] ArrayComm supports this conclusion, because permitting licensees the flexibility to choose the services that they will deliver, and thereby determine their regulatory status, based on market opportunity will best encourage the efficient and complete use of this spectrum.

The Commission's proposed rule advances the public interest in ensuring that spectrum is used to its maximum reach and capability. It will allow carriers to serve as many customers as possible, without being restricted by an artificial distinction specified in its initial license application of "common carrier" or "private."[31] Indeed, the Commission adopted this flexible

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[29] *Reallocation NPRM* ¶ 78.

[30] *Id*.

[31] ArrayComm also proposes that, although some licensees may act principally or solely as common carriers, the Commission should forbear from regulating licensees under historical Title II common carrier regulations. *See* Section III.E., *infra*.

regime five years ago for Local Multipoint Distribution Service ("LMDS") services.[32] The Commission noted then that licensees need "the flexibility to design their service offering in response to market demand."[33] This reasoning is equally sound in this proceeding, where service providers must continually stay ahead of market developments and seek the widest possible subscription of services. The Commission should therefore adopt its proposed rule granting flexible regulatory status.

B. The Commission Should Provide Broad Applicant Eligibility Subject to Congress's Clear Foreign Ownership Restrictions in Section 310 of the Act

The Commission proposes not to impose any license eligibility requirements other than the foreign ownership restrictions provided in Section 310 of the Act, 47 U.S.C. § 310.[34] The Commission states that it seeks to "open[] this spectrum to as wide a range of applicants as possible" in order to "encourage entrepreneurial efforts to develop new technologies and services[.]"[35] ArrayComm agrees that eligibility for the 1670-1675 MHz band should be as broad as possible, subject to the restrictions of Section 310.

Eligibility restrictions are a useful tool for ensuring that spectrum does not become concentrated in the hands of incumbent monopolists.[36] Further, such restrictions prevent the use

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[32] *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, CC Docket No. 92-297, Second Report and Order, FCC 97-82, 12 FCC Rcd. 12545, 12636-38 (1997) ("*LMDS Second Report and Order*").

[33] *LMDS Second Report and Order*, 12 FCC Rcd. at 12636.

[34] *Reallocation NPRM* ¶¶ 81, 83.

[35] *Reallocation NPRM* ¶ 81.

[36] Eligibility restrictions may also be required, explicitly or impliedly, by statute. *See*, *e.g.*, *LMDS Second Report and Order*, 12 FCC Rcd. at 12609 (finding that there is no statutory prohibition on an incumbent LEC obtaining an LMDS license). Nothing in the Communications Act or related legislation, however, includes such a proviso for the 1670-1675 MHz band.

of newly-authorized spectrum as a means of leveraging a monopoly into a competitive market.[37] In the instant case, however, the proposed use of the 1670-1675 MHz band has applications that would not compete directly with such entities or, if so, has not been sought after by those monopolist entities. Open licensing eligibility is thus in the public interest of encouraging new entry and investment[38] while bearing little risk of monopolistic abuse.[39]

The Commission's foreign ownership restrictions, however, should remain intact for this spectrum. As the Commission explains, its rules implementing Section 310 of the Act impose foreign ownership restrictions on licensees, with more onerous restrictions applied to licensees providing common carrier services.[40] This construct is appropriate for the forthcoming licenses in the 1670-1675 MHz band. The Commission should therefore adopt its tentative conclusion that it should apply only the foreign ownership restrictions on license eligibility.

C. The Commission Should Adopt Its Proposed 10-Year License Term With Renewal Expectancy Contingent Upon Provision of Substantial Service

The *Reallocation NPRM* proposes to grant licenses in the 1670-1675 MHz band for a period of 10 years with a renewal expectancy similar to that afforded to PCS carriers.[41] The

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[37] For example, the Commission excluded incumbent LECs, such as BellSouth, from obtaining certain LMDS licenses for three years on the grounds that they could use the spectrum to thwart new entrants attempting to provide competitive services. *LMDS Second Report and Order*, 12 FCC Rcd. at 12616-17.

[38] Congress's intent in requiring the reallocation and licensing of new radio spectrum holds a clear public interest purpose: "The Commission is required to adopt bidding methodologies that promote rapid deployment of advanced services to all the people of the United States, including those in rural areas; provide opportunities for small businesses, and prevent the selling of licenses for unjust enrichment." *House Report*, 103rd Cong., 1st Sess. at 246.

[39] The Commission adopted a similarly broad eligibility approach in the *Part 27 Order*, reasoning that "opening the [wireless communications system] market to a wide range of applicants will permit and encourage entrepreneurial efforts to develop new technologies and services." *Part 27 Order*, 12 FCC Rcd. at 10829.

[40] *Reallocation NPRM* ¶ 81 (citing 47 C.F.R. § 27.12).

[41] *Reallocation NPRM* ¶ 86.

Commission further seeks comment on the standard to apply to this renewal expectancy: either (i) the "substantial service" test;[42] or (ii) a "build-out requirement."[43] ArrayComm suggests that a 10-year license with a substantial service renewal expectancy is the appropriate licensing regime for the 1670-1675 MHz band. As the Commission notes, this renewal expectancy construct, coupled with 10-year licenses, will provide "a stable regulatory environment that will be attractive to investors," thereby encouraging new entry and investment in services on this band. This licensing construct is, as recognized in the *Reallocation NRPM*,[44] in keeping with consistent Commission policy in several other proceedings.[45]

ArrayComm recognizes the Commission's mandate to "prevent stockpiling or warehousing of spectrum by licensees or permittees."[46] Imposing a substantial service threshold for renewal expectancy adheres to that mandate, because it ensures that licensees are actually building and serving end users with new, innovative services. The substantial service threshold is not so high, however, as to place unreasonable or onerous deployment schedules on what will largely be new entrants offering innovative services. This standard, as defined by the Commission, has a commercially meaningful application – requiring provision of more than "mediocre" or "minimal" service – that achieves its requisite goal of fostering a competitive services market.

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42 Substantial service is defined as "service which is sound, favorable, and substantially above a level of mediocre service which just might minimally warrant renewal." *E.g.*, 47 C.F.R. § 22.940(a)(1)(i) (substantial service test applied to cellular comparative renewal proceedings).

43 *Reallocation NPRM* ¶ 94.

44 *Id*. ¶ 86.

45 *See*, *e.g.*, *Part 27 Order*, 12 FCC Rcd. at 10840 ("The WCS license terms will be 10 years, with a renewal expectancy similar to that afforded PCS and cellular licensees.").

46 *House Report*, 103rd Cong., 1st Sess. at 256.

Adoption of a substantial service standard for renewal expectancy is therefore more in keeping with the public interest and should be adopted.

D. ArrayComm Agrees That Geographic Partitioning and Spectrum Disaggregation Are in the Public Interest and Should Be Permitted in the 1670-1675 MHz Band

The Commission seeks comment on its proposal to permit geographic partitioning and spectrum disaggregation in the 1670-1675 MHz band.[47] ArrayComm believes that this proposal could serve the public interest, as it grants licensees further flexibility in use of the spectrum, which is in keeping with the Commission's general goal in this band.[48] ArrayComm emphasizes, however, that its foremost concern in this proceeding is that the Commission adopt the single nationwide licensing scheme proposed in the *Reallocation NPRM*. Nonetheless, ArrayComm acknowledges that in the future, due to technological advances, partitioning and disaggregation of this spectrum may encourage new and efficient uses of this spectrum (*e.g.*, by assisting in the rapid build-out of a ubiquitous nationwide 1670-1675 MHz *i-BURST* network) and is therefore in the public interest.

The Commission has adopted geographic partitioning and spectrum disaggregation for wireless services in order to provide "desirable flexibility to determine the amount of spectrum they will occupy and the geographic area they will serve."[49] It has applied this policy historically to CMRS licenses as well as to personal communications services ("PCS")

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47 *Reallocation NPRM* ¶¶ 89-90.

48 *See*, *e.g.*, *Reallocation NPRM* ¶ 16 ("[W]e seek to develop service rules that are not based on a Commission prediction of how these bands may ultimately be used, but instead reflect a record that enables us to establish maximum practicable flexibility.").

49 *Geographic Partitioning and Spectrum Disaggregation by Commercial Mobile Radio Service Licensees*, WT Docket No. 96-148, Report and Order, FCC 96-474, 11 FCC Rcd. 21831, 21833 (1996) ("*Partitioning and Disaggregation Order*").

licenses.[50] This policy is equally beneficial to licenses in the 1670-1675 MHz band, in order to permit maximum usage of the available spectrum and encourage new market entry. Moreover, it empowers the licensee to determine how best to utilize the allocated spectrum – a result entirely in keeping with the scheme of nationwide licenses that is crucial for the 1670-1675 MHz band.

ArrayComm therefore believes that partitioning and disaggregation within the 1670-1675 MHz band are in the public interest. It supports the Commission's tentative conclusion on this matter, insofar as it will not militate against its primary goal of achieving a nationwide license, and thus national service ubiquity, for this spectrum.

E. The Commission Should Forbear from Applying Historical Title II Regulatory Requirements on Innovative Services Provided in the 1670-1675 MHz Band

The Commission also seeks comment on whether it should, consistent with its policies with respect to CMRS providers generally, forbear from applying historical Title II common carrier regulations on entities licensed in the 1670-1675 MHz band.[51] These regulations include tariffing, ratesetting, interconnection, and contract filing under Sections 203, 204, 205, 211 and 212 of the Act.[52] ArrayComm urges the Commission to apply forbearance in this proceeding, as

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50 *Id.* at 11833.

51 *Reallocation NPRM* ¶ 96.

52 ArrayComm notes that these and other Title II provisions may not apply in the first instance, as it will provide data-centric services rather than traditional circuit-switched wireless voice services. *Cf. Personal Communications Industry Association's Broadband Personal Communications Services Alliance's Petition for Forbearance for Broadband Personal Communications Services*, WT Docket No. 98-100, Memorandum Opinion and Order, FCC 98-134, 13 FCC Rcd. 16857, 16861 (1998) ("*PCIA Forbearance Order*") (declining to forbear from applying Sections 1 and 2 of the Act to broadband PCS carriers whose service is "a replacement for land line telephone exchange service"); *Forbearance from Applying Provisions of the Communications Act to Wireless Telecommunications Carriers*, WT Docket No. 98-100, FCC 00-311, 15 FCC Rcd. 17414, 17420 (2000) ("*CMRS Forbearance Order*") (establishing forbearance for CMRS providers largely comprising wireless voice service providers). ArrayComm nonetheless supports full forbearance for this spectrum, regardless of its use, because of the strongly competitive characteristics of broadband wireless services generally.

the nascent and highly specialized nature of the services to be provided over this spectrum require little active Commission regulatory oversight.

Section 10 of the Communications Act, as amended, 47 U.S.C. § 160, provides that "the Commission shall forbear from applying any regulation or any provision of the Act to a telecommunications carrier" where the Commission finds that such enforcement is not necessary to ensure just and reasonable terms and conditions of service or to protect consumers, and that forbearance from enforcement is in the public interest.[53] As the *Reallocation NPRM* notes, the Commission has already decided to forbear from regulating CMRS providers under Sections 203, 204, 205, 211 and 212 of the Act under this test.[54] The notice also states that the Commission has forborne from applying Section 203 tariffing requirements for competitive LECs and competitive access providers under its permissive tariffing regime.[55] ArrayComm submits that these approaches are appropriate for the 1670-1675 MHz band, and further suggests that forbearance from applying the nondiscrimination requirements of Sections 201 and 202 should also be adopted for this spectrum.

ArrayComm recognizes that the Commission declined to forbear from applying Section 201 and 202 regulations for CMRS and PCS services. These decisions rested on the market conditions for these services, which did not "ensure that the charges, practices, classifications

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[53] 47 U.S.C. § 160(a). ArrayComm notes that Section 332 of the Act provides similar forbearance authority specific to mobile services, but that the Commission historically has relied upon Section 10 in the context of wireless service regulation as "there is no decisionally significant distinction between the substantive standards for forbearance set out in Section 10 and in Section 332(c)(1)(A)." *CMRS Forbearance Order*, 15 FCC Rcd. at 17420.

[54] *Reallocation NPRM* ¶ 96.

[55] *Id*.

and regulations" warranted Commission forbearance.[56] For example, the Commission found that in the broadband PCS market "the competitive development of the industry . . . is not yet complete and continues to require monitoring."[57] Thus, this market did not exhibit the requisite vigorous competition required for a showing of public interest.

The instant case does not exhibit the same market conditions as the broadband PCS market. The uses ArrayComm proposes for the 1670-1675 MHz band, *i-BURST* services, would involve a non-voice offering in the increasingly competitive environment of wireless Internet access service.[58] Or, what is more compelling, parties like ArrayComm will likely utilize this spectrum in part for services with public safety applications, whose core purpose is the public interest. These facts show that the potential for use of this band in a manner harmful to consumers is unlikely, such that enforcement of Sections 201 and 202 for these services is unnecessary. Indeed, enforcement of these regulations is precluded if its principal result would be to discourage investment and deployment of new services.[59]

ArrayComm therefore urges the Commission not to apply traditional Title II common carrier regulations to the innovative, nascent services proposed for the 1670-1675 MHz band. At the least, the Commission should adopt its prior CMRS approach with respect to forbearance from enforcement of Sections 203, 204, 205, 211 and 212 of the Act. ArrayComm further

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56 *PCIA Forbearance Order*, 13 FCC Rcd. at 16866.

57 *Id*., 13 FCC Rcd. at 16870.

58 This market is so competitive, in fact, that the Commission is considering whether to deregulate broadband Internet access services provided by incumbent LEC monopolists. *See generally Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services*, CC Docket No. 01-337, Notice of Proposed Rulemaking, FCC 01-360 (rel. Dec. 20, 2001).

59 *See* 47 U.S.C. § 160(a).

submits, however, that complete forbearance, including Sections 201 and 202, is warranted in these unique circumstances.

IV. The Commission Should Apply the Substantial Service Test for Reviewing Licensee Operating Performance in the 1670-1675 MHz Band

The *Reallocation NPRM* requests comment on whether the Commission should review licensee performance under the substantial service test or a "construction requirement" in order "to ensure that spectrum is used effectively and service is implemented promptly."[60] The substantial service test is the appropriate tool for this purpose, because, as is also true in the renewal expectancy context,[61] it best ensures that the spectrum awarded by the Commission is in fact used to bring innovative services to end users.

The substantial service test requires that licensees actually provide service to end users "which is sound, favorable, and substantially above a level of mediocre service."[62] Thus, applying this test on review of licensees' use of the 1670-1675 MHz spectrum focuses on the net benefit to American consumers. Such review directly furthers Congress's goal in authorizing the FCC to license new spectrum, namely to ensure that licensees "efficiently utilize[] the spectrum for the benefit of the public."[63] This aim is particularly relevant to the high-speed data transmission services that ArrayComm will bring to the public over its *i-BURST* network.[64]

For these same reasons, the construction test is not the appropriate framework for reviewing licensee operational performance. This test focuses on whether a licensee "reaches,"

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60 *Reallocation NPRM* ¶ 94.

61 *See* Section III.C, *supra*.

62 *Reallocation NPRM* ¶ 94.

63 *House Report*, 103rd Cong., 1st Sess. at 246.

64 "The Commission is required to adopt bidding methodologies that promote rapid deployment of advanced services to all the people of the United States[.]" *House Report*, 103rd Cong., 1st Sess. at 246.

or passes, a certain proportion of the relevant population[65] but does not ask whether the licensee is actually serving any end user. Although it does establish a bright-line standard for performance review, it is less likely to ensure that the public truly benefits from the Commission's awarding the spectrum. For example, having population-based coverage requirements during the term of the initial license could restrict a licensee's flexibility to roll-out new services or networks as consumer requirements change, which they often do. In such a case, instead of developing services or enabling new networks, the licensee would be forced to build its original network and offer its original services to meet the mid-term population-based construction requirements.

ArrayComm strongly recommends that the Commission adopt the substantial service test for licensee performance because it will better ensure that the public derives a direct benefit from the authorized spectrum, in keeping with Congress's mandates, and will provide the licensee with the flexibility needed to satisfy the ever-changing service demands of the public.

V. Technical Rules

As an initial matter, ArrayComm urges the Commission to adopt and release its final technical rules well in advance of the auction, in order that potential applicants can seek accurate valuation of the spectrum. Absent a reliable valuation, applicants could be hindered in obtaining financing for the auction.

Many of the technical issues in this proceeding relate to the apparently competing requirements of, on the one hand, in-band emissions rules that enable a wide range of flexible and commercially valuable uses for the spectrum, and, on the other hand, out-of-band emissions rules and protection requirements that adequately safeguard critical government and scientific

[65] *See Reallocation NPRM* ¶ 94.

services. ArrayComm respectfully submits that the commercially and technically correct set of guiding regulatory principles here is as follows.

First, in-band emissions limits should be set in consideration of coordination requirements at license boundaries and RF safety issues. Second, out-of-band emissions requirements should be set in consideration of the general protection requirements of adjacent band systems. Third, in the case of adjacent band systems with relatively sparse deployments and exceptional protection requirements — as with the radioastronomy and radiosonde systems to be discussed below — appropriate protection and out-of-band emissions requirements should be applicable only at the protected sites.

Requiring each piece of equipment in a 1670-1675 MHz commercial system to provide exceptional out-of-band protection at all locations and at all times, regardless of whether there is adjacent band equipment in the vicinity requiring such protection, places an unreasonable burden on the commercial operator that benefits no one. ArrayComm submits that rules should be developed according to the principles above, thereby guaranteeing coordination, safety and protection, but that the license holder should otherwise be given maximum flexibility in selecting the technical measures it will employ to meet them.

A. General Technical Rules (RF Emissions, Equipment Authorization, Frequency Stability)

As stated earlier in these Comments, ArrayComm supports the Commission's general proposal to apply its Part 27 rules to the 1670-1675 MHz band. In the *Reallocation NPRM*, the Commission specifically proposes to apply certain technical provisions of Part 27 to this band.[66] ArrayComm supports the application of these Part 27 provisions with two significant exceptions.

[66] *Reallocation NPRM* ¶ 97.

First, with respect to routine environmental evaluations,[67] commercial operations in the 1670-1675 MHz band should be subject to the same threshold levels as Broadband PCS. Although the Broadband PCS threshold levels are less restrictive than the Wireless Communications Services levels, the safety of the Broadband PCS levels has been established through thousands of commercially operating Broadband PCS sites. The Commission should therefore adopt the less restrictive threshold levels in the interests of reducing the regulatory burden on commercial services in the 1670-1675 MHz band, and thereby hastening the availability of consumer services in the band.

Second, with regard to the applicability of Section 27.63 of the Commission's rules — Disturbance of AM Broadcast Station Antenna Patterns — to the 1670-1675 MHz band, ArrayComm has researched the proceeding leading up to *the Part 27 Order*, the apparent genesis of Section 27.63,[68] but was unable to discern the motivation for that rule in the record. Section 27.63 should only be applicable to operations in the 1670-1675 MHz band if there is a valid technical concern that such operations might disturb AM broadcast station antenna patterns. Otherwise, Section 27.63 should not be applied to 1670-1675 MHz operations because it results in additional coordination burdens for licensees without a corresponding benefit.

B. In-Band Emission Limits

The Commission seeks comment on the appropriate technical restrictions for in-band, or co-channel, interference.[69]

ArrayComm supports the Commission's proposal to use field strength limits at license boundaries to limit co-channel interference.[70] Field strength limits, as opposed to coordination

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67 47 C.F.R. §1.1307, Table 1; 47 C.F.R. § 27.52.

68 47 C.F.R. § 27.63.

69 *Reallocation NPRM* ¶ 98.

requirements, can be unilaterally predicted and verified by a commercial operator even for multicell deployments, which is especially important with cellular infrastructures where an operator may have multiple sites located along a license boundary. Field strength limits have proven to be adequate in the PCS service.

A field strength limit of 47 dBuV/m is appropriate for the 1670-1675 MHz band.[71] This is equivalent to a -95 dBm signal level at the output port of an omnidirectional antenna, and is therefore close to the receiver sensitivities of a wide range of commercial cellular devices. It thereby provides a balance of acceptable service at the boundary while limiting excessive emissions across it. In the case of fixed services, where directional antennas are typically used on both ends of the radio link, the antennas of each operator's customers will be focused at their serving base station, and vice-versa, further mitigating the effects of emissions from systems on the other side of a license boundary.

The Commission also asks if power or antenna height limits are necessary or appropriate to effect coordination.[72] ArrayComm has most recently proposed in-band emissions limits of 2 kW EIRP for base equipment and 4 W EIRP for mobile equipment.[73] These emissions limits enable, among other things, the delivery of wide-area broadband data services including high uplink data rates. They stand midway between the Broadband PCS limits of 1640 W EIRP base and 2 W EIRP mobile,[74] and the WCS limits of 2 kW EIRP base and 20 W EIRP mobile at 2.3

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70 *Reallocation NPRM* ¶¶ 99, 101.

71 *Reallocation NPRM* ¶ 102.

72 *Reallocation NPRM* ¶ 104.

73 ArrayComm ET 00-221 Reply Comments, Appendix, Section XX.13. In its original comments, ArrayComm had proposed 1640 W EIRP base and 4 W EIRP mobile in-band limits as noted in the *Reallocation NPRM* at paragraph 113.

74 47 C.F.R. § 24.232.

GHz.[75] As such, they are wholly consistent with the rules applied by the Commission to other wide-area cellular services from the perspectives of both coordination and RF safety.

At license boundaries, operators should be allowed the flexibility to use all technical tools at their disposal to meet the boundary emissions requirements. These tools would certainly include the limiting of EIRP's and antenna heights, but, with clearly stated boundary emissions requirements, there should be no need for the Commission to specify in advance the tools that the operator should employ, which might also include guardbands, for example. Should the Commission decide that antenna height limits are required, however, those appearing in the Broadband PCS rules,[76] suitably adjusted for any difference in EIRP limits adopted for the instant spectrum, would be appropriate.

C. Out-of-Band Interference Control and Technical Restrictions for the 1670-1675 MHz Band

The Commission also seeks comment on which out-of-band emission limits are appropriate for the 1670-1675 MHz band.[77] As stated *supra,* ArrayComm has proposed in-band per-carrier peak emissions limits of 2 kW EIRP for base operations and 4 W EIRP for mobile operations.[78] Compliance with these measurements can be directly verified through measurement of the in-band per-carrier power generated by a device at the input to its antenna port, and then multiplying that measured power by the gain of the device's antenna as referenced to an omnidirectional radiator. Also stated above is our belief that in-band emissions limits or antenna heights[79] should be specified only in consideration of RF safety and in-band emissions at

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75 47 C.F.R. § 27.50.

76 47 C.F.R. § 24.232.

77 *Reallocation NPRM* ¶ 105.

78 *Reallocation NPRM* ¶¶ 105, 113.

79 *Reallocation NPRM* ¶ 105.

a license boundary. Out-of-band emissions limits should be set in consideration to the protection requirements of adjacent band systems; the operator should have the flexibility to determine how it can meet those protection requirements while taking the best advantage of its in-band prerogatives.

The *Reallocation NPRM* discusses the general out-of-band emissions limits suggested earlier in the record and asks the extent to which these limits will prevent harmful interference to government incumbents.[80] These incumbents include radioastronomy operations in the lower adjacent 1660-1670 MHz band. They also include radiosonde systems in the upper adjacent 1675-1690 MHz band. Although radiosonde systems are not mentioned in the NPRM, commercial operations in the 1670-1675 MHz band must afford them protection under the Spectrum Reallocation Final Report associated with the OBRA Act that reallocated the instant spectrum for commercial purposes.[81] Detailed descriptions of the services and analyses of their coexistence with commercial operations in 1670-1675 MHz were provided by ArrayComm in its earlier comments in this proceeding.[82]

Radioastronomy and radiosonde systems are extremely susceptible to interference in comparison to general terrestrial communications services, and clearly fall in the category of the systems described above requiring "exceptional" protection. These systems are sparsely deployed, however. The appropriate regulatory response is therefore to specify general out-of-band emissions requirements that an operator must meet system-wide, complemented by specific protection or coordination requirements that apply only in the immediate vicinity of protected sites. In contrast, an out-of-band emissions specification designed to protect radioastronomy and

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80 *Reallocation NPRM* ¶¶ 106-113.

81 NTIA Special Publication 95-32, Appendix C.

82 ArrayComm ET 00-221 Comments at 22-34, 43, and Appendices B, C and D thereto.

radiosonde operations and applicable to all equipment operating in the instant band, at all locations and at all times, would render the 1670-1675 MHz band worthless for wide-area operations, as will be shown below. For this reason, ArrayComm proposes a general out-of-band limit that is essentially identical to the out-of-band emissions rules specified for WCS and for Broadband PCS.[83] In the *Reallocation NPRM*, the Commission appears to agree that this limit is appropriate.[84]

1. Protection of Radioastronomy Operations

A simple numerical example demonstrates that no commercially reasonable out-of-band emissions specification will, by itself, adequately protect radioastronomy. The example is for a generalized commercial device, one that is representative of the mobile devices for any of the applications proposed in the record for the 1670-1675 MHz band: ArrayComm's application, as well as AeroAstro's and Microtrax's. By converting the general out-of-band emissions limits proposed by each of these parties into directly comparable units, it is easily shown that none of the proposed emissions limits lead to meaningful protection for radioastronomy operations. For the reasons provided below, and as ArrayComm has consistently stated in this proceeding, site-specific protection criteria must be adopted for protected radioastronomy (and radiosonde) sites. In this context, general out-of-band emissions limits simply promote good engineering practices by moderating out-of-band emissions behavior.

Each of the commenters on the instant spectrum has proposed general out-of-band emissions limits.[85] To compare them, one can convert them all to equivalent EIRP power spectral densities by assuming a 0 dBi antenna, as might be found on the mobile terminals of any

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[83] 47 C.F.R. §§ 24.238(a), 27.53(a)(3).

[84] *Reallocation NPRM* ¶ 112.

[85] *Reallocation NPRM* ¶¶ 108-113.

of the systems, and a 500 kHz measurement bandwidth. AeroAstro's proposed limit is then 7 dBm EIRP/500 kHz, ArrayComm's is –13 dBm EIRP/500 kHz and Microtrax's is –25 dBm EIRP/500 kHz. Microtrax's proposed limit, the most conservative of the three, will be used in the sequel.[86]

Radioastronomy receivers, which receive signals from cosmic sources millions of light-years away, are extremely sensitive. Employing the radioastronomy specifications of ITU-R RA.769-1, and ITU-R SA.509.2, and assuming an antenna gain of 0 dBi in the horizontal direction for the telescope's antenna,[87] the peak permissible interference level for single-antenna radio telescopes operating at 1665 MHz, a power spectral flux density of –161 dBm/MHz-m^2, can be expressed as -190 dBm EIRP/500 kHz as measured at the radio telescope's antenna. Hence, using Microtrax's conservative out-of-band emissions limit, a commercial device's signal would have to be attenuated by a factor of 165 dB (190 – 25), or thirty-thousand-trillion, to avoid interfering with operations at the radioastronomy site. This factor of thirty-thousand-trillion reduction in signal power can be converted to an equivalent distance separation required between the commercial device and the radio telescope. Employing the same shadowed COST231-Hata model employed in our Comments,[88] the equivalent separation distance is 17 kilometers.

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[86] ArrayComm's proposed out-of-band emissions limit is therefore midway between those of the other commenters'. AeroAstro's limit is the least restrictive, contrary to the inference drawn from paragraph 112 of the *Reallocation NPRM*.

[87] The applicability of these specifications has been independently confirmed with Dr. Tomas Gergeley, Electromagnetic Spectrum Manager of the National Science Foundation's Division of Astronomical Sciences, during a 17 January 2001 meeting. Additional details on radioastronomy and interference analysis can be found in ArrayComm's initial comments in the allocation proceeding. ArrayComm ET 00-221 Comments at 23-30 and Appendices B and C thereto.

[88] ArrayComm ET 00-221 Comments, Appendix C at 2.

A single portable device for any of the proposed applications in this band, operating at a general out-of-band emissions limit, which is notably more conservative than the general out-of-band limits adopted elsewhere by the Commission, would present significant interference to radiotelescope operations if it operated within 17 km of a radiotelescope site. This example demonstrates three things. First, special and exceptional protection requirements are required by radioastronomy sites. Second, the locations of protected radioastronomy sites must be known in advance by an operator. Third, attempting to protect radioastronomy sites with a general system-wide out-of-band emissions limit is neither feasible nor desirable. Such general out-of-band emissions limits would have to be billions of times more stringent than those proposed by any of the commenters, and well beyond state-of-the-art for all but very short-range commercial communications equipment.

As a practical matter, meaningful protection for radioastronomy operations in the 1660-1670 MHz band requires that commercial systems in the 1670-1675 MHz band be prevented from operating in the immediate vicinity of protected radioastronomy sites.

ArrayComm believes, and has consistently advocated, that radioastronomy requires meaningful protection and that it is only possible to do so with knowledge of the specific sites to be protected and the protection criteria.[89] In other parts of its rules the Commission has been willing to identify the specific radioastronomy sites to be afforded protection.[90] We respectfully ask that the Commission do so here.

In particular, ArrayComm asks that the Commission specify that the sites to be protected are those sites making measurements in the 1660-1670 MHz band that are operated by or in

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89 ArrayComm ET 00-221 Comments at 29-30, 43-48, 57-57. *See also* ArrayComm ET 00-221 Reply Comments at 6-12, Appendix, Section XX.19(d).

90 47 C.F.R. §§ 1.924, 25.213.

conjunction with the National Science Foundation, similar to what was done in the MSS bands. We also ask that the protection requirements and coordination procedures be those described in our Reply Comments.[91] ArrayComm has shown that, subject to those proposals, radioastronomy operations can be protected from commercial operations in the instant band.[92]

The analysis above demonstrates that any alternative approach will not afford protection for radioastronomy services. As importantly, lack of specificity in protection requirements raises the chilling commercial scenario in which an operator might be required to terminate service over an area of hundreds of square kilometers due to the unexpected appearance, following the instigation of commercial service, of a radioastronomy operation for which protection is mandated. Such uncertainty would significantly increase the perceived risk associated with the instant spectrum and greatly reduce its value at auction.

During a meeting with ArrayComm last year, the National Science Foundation ("NSF") indicated[93] that sites at the following locations should be protected:

- Arecibo, Puerto Rico;
- Greenbank, West Virginia;
- Very Large Array, Socorro, New Mexico;
- Hat Creek, California;
- NASA Goldstone, California; and
- Very Large Baseline Array, locations specified in §25.213(a)(1)(ii) of the Commission's rules.

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91 ArrayComm ET 00-221 Reply Comments, Appendix, Section XX.19(d).

92 ArrayComm ET 00-221 Comments at 27-30.

93 The site list was provided by Dr. Tomas Gergeley, Electromagnetic Spectrum Manager of the National Science Foundation's Division of Astronomical Sciences, during a 17 January 2001 meeting.

This list is identical to that of footnote US331 to the spectrum table in Section 2.106 of the Commission's rules with the exception of the Owens Valley site appearing in that footnote.[94] Moreover, if the radioastronomy community is comfortable with the 1.4 GHz coordination distances and zones specified in that footnote, those coordination distances and zones would also be appropriate thresholds for triggering coordination with commercial operations in 1670-1675 MHz.[95]

NSF indicated at that same meeting that the construction of new NSF sites is highly unlikely within the next five years, and unlikely within the next ten years. The list of protected sites would therefore be a stable one, suitable for inclusion in the Commission's rules. ArrayComm proposes a one-year notification and comment period for modifications to the list of protected radioastronomy sites.

ArrayComm urges the Commission to adopt the NSF list of protected sites and the protection requirements described above, providing definite, final parameters to services carried over the 1670-1675 MHz band. Moreover, the Commission should adopt this clear standard well in advance of the auction in order that potential applicants can obtain accurate valuation, and hence financing, that will allow them to participate.

2. Protection of Radiosonde Operations

Radiosonde operations in the upper adjacent band are also extremely sensitive, although not as sensitive as radioastronomy operations. Using the same analysis method applied to radioastronomy above and the radiosonde protection criteria of the Spectrum Reallocation Final

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94 *Reallocation Order* Appendix C at page 57.

95 Tolerable interference levels for radioastronomy are higher at 1670 MHz than at 1400 MHz, see ITU-R RA.769-1 at Table 1.

Report,[96] the peak level of interference permitted at radiosonde receiver sites operating in 1675-1690 MHz for less than 0.24% of any operating interval, a power spectral flux density of –120 dBm/1.3MHz-m^2, can be expressed as -150 dBm/500 kHz EIRP as measured at the radiosonde receiver's antenna. Hence, using Microtrax's conservative out-of-band emission limit, a commercial device's signal would have to be attenuated by a factor of 125 dB (150 – 25), or three-trillion, to avoid interfering with radiosonde operations at the victim site. This factor of three-trillion reduction in signal power can be converted to an equivalent distance separation required between the commercial device and the radiosonde receiver. Employing the same shadowed COST231-Hata model employed in our Comments,[97] the equivalent separation distance is 1.2 kilometers.

A single portable device for any of the proposed applications in this band, operating at a general out-of-band emissions limit which is notably more conservative than the general out-of-band limits adopted elsewhere by the Commission, would present significant interference to radiosonde receiver operations if it operated within 1.2 km of the receiver site. As with the protection of radioastronomy operations, the protection of radiosonde operations is an exceptional situation requiring special protection criteria applied at the radiosonde site.

As a practical matter, meaningful protection for radiosonde operations in 1660-1670 MHz requires that commercial systems in 1670-1675 MHz be prevented from operating in the immediate vicinity of protected radiosonde sites.

There are, however, three important differences from the radioastronomy case. First, as evidenced by the preceding example, the requirement to protect a radiosonde receiver site might

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[96] NTIA Special Publication 95-32, Appendix C. These protection criteria were affirmed by NTIA and NWS during a 6 February 2001 meeting.

[97] ArrayComm ET 00-221 Comments, Appendix C at 2.

only excise a few square kilometers from an operator's commercial coverage (as opposed to the hundreds of square kilometers impacted by a radioastronomy operation). Second, there is a relatively large number of radiosonde receiver sites. The National Weather Service operates approximately seventy sites in the continental United States,[98] and these sites must be relocated, albeit infrequently, due to operational requirements of the Weather Service. The large number of sites and their quasi-portable nature makes it impractical, if not impossible, to create a list suitable for inclusion in the Commission's rules. Third, unlike radioastronomy, radiosonde operations can shift their operating frequencies — either towards the upper end of the 1675-1690 MHz band using the tuning features of current equipment operating in that band, or perhaps even to an alternate radiosonde band such as the 401-406 MHz band — further reducing this service's susceptibility to interference from commercial operations in the 1670-1675 MHz band. With the cooperation of all involved parties, and over time, protection of radiosonde operations could become easier than it is today.

Nonetheless, because of the special and exceptional protection requirements for radiosonde operations, a commercial operator would have to at least know with whom to coordinate in order to guarantee meaningful protection and prevent the sort of commercial catastrophe describe earlier. With that knowledge, as shown in our Comments,[99] commercial operations in the instant band could protect radiosonde operations in 1675-1690 MHz.

As detailed in our Reply Comments,[100] we propose that all National Weather Service and Department of Defense radiosonde receiver sites be protected; and that the requirement to protect those radiosonde operations, and only those radiosonde operations, be included in the

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98 ArrayComm ET 00-221 Comments, Appendix D at 4-9.

99 ArrayComm ET 00-221 Comments at 34-35, and Appendix C thereto.

100 ArrayComm ET 00-221 Reply Comments at 8-10.

Commission's ultimate rules. The required level of protection should also be well defined and based on the OBRA requirements as we attempted to do in our Reply Comments.[101] A well defined, bilateral coordination process could be formulated in which the 1670-1675 MHz commercial operator and the NWS and DOD radiosonde users notify one another of proposed changes to their respective networks and coordinate to ensure protection. This process would respect both the commercial imperatives of the instant spectrum, as well as the critical national security and economic role played by meteorological services.

ArrayComm urges the Commission to define the National Weather Service and the Department of Defense as the sole agencies whose radiosonde operations will be protected and to adopt the protection requirements described above, providing definite, final parameters to services carried over the 1670-1675 MHz band. Moreover, the Commission should adopt this clear standard well prior to the auction in order that potential applicants can obtain accurate valuation, and hence financing, that will allow them to participate.

3. Cellular Architecture

The Commission asks whether cellular architectures should be banned in the 1670-1675 MHz band with the intent of fostering the protection of adjacent band services.[102] As a general matter, and as described above, ArrayComm's belief is that in-band operations and out-of-band emissions should be treated separately in the Commission's rules to allow the operator maximum flexibility in determining how it will best provide the mandated protection for adjacent band operations. With regard to the instant spectrum, all of the commenters have proposed systems with mobile devices that could range relatively freely within the license area. Banning a cellular architecture, loosely defined for the purpose of these comments as one with multiple base sites in

[101] ArrayComm ET 00-221 Reply Comments, Appendix, XX.19(d).

a given market, would therefore not guarantee any level of interference protection for adjacent band systems and could proscribe some or all of the proposed applications for the band.

A cellular architecture may in fact be a key element in ensuring the protection of adjacent band services. As noted in ArrayComm's comments filed earlier in the allocation proceeding,[103] if a system has base stations whose downlink coverage areas can be limited and if the mobile stations for that system follow a "listen before talk" protocol in which the mobile stations do not transmit unless they can successfully receive certain downlink control channels from the base station, protection of adjacent band operations from base station and mobile transmissions can be ensured. Such systems permit the locations from which mobiles will transmit to be controlled through the design of base station downlink coverage areas.

VI. Coordination

A. Coordination with Canada and Mexico

The Commission seeks comment on its interim proposal to adopt the same in-band emissions requirements at the Mexican and Canadian borders with the United States as it does for borders between geographic service areas.[104] Assuming that a field strength limit is adopted as described *supra*, ArrayComm supports this proposal. We believe that the aforementioned 47 dBuV/m field strength limit would provide adequate protection for a wide range of potential co-channel commercial services in Canada and Mexico.

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[102] *Reallocation NPRM* ¶ 114.

[103] ArrayComm ET 00-221 Comments at 29.

[104] *Reallocation NPRM* ¶139.

B. Coordination with Incumbent Government Operations

ArrayComm's position regarding the protection of adjacent-band radioastronomy operations[105] and adjacent-band radiosonde operations has been described *supra*.

As the Commission notes,[106] requiring site-by-site coordination for spectrum licensed on a geographic area basis would be neither efficient nor feasible. Licensees of such commercial spectrum may deploy technologies with multiple mobile and fixed stations in the general vicinity of a protected site. Adequate protection of adjacent-band or co-channel services can only be assessed through an analysis involving the entirety of the equipment under the licensee's control within some predefined coordination distance of the protected site. ArrayComm supports the Commission's proposal to require coordination of both fixed and mobile stations whose operation may impinge upon a protected site,[107] so long as the coordination process allows multiple fixed and mobile stations, a portion of cellular network for example, to be handled via a single coordination process. Working with the National Oceanic and Atmospheric Administration (NOAA), we developed a proposal for such a process which would apply to coordination with the Greenbelt METSAT site.[108] A single coordination process encompassing multiple fixed and mobile commercial stations should be an option for coordination with all adjacent band operations and with co-primary meteorological satellite operations. We ask the Commission to explicitly incorporate this option in Section 1.924(f) of its rules.[109]

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[105] *Reallocation NPRM* ¶123.

[106] *Reallocation NPRM* ¶128.

[107] *Reallocation NPRM* ¶129.

[108] Letter from Randall Coleman, ArrayComm, to Magalie Roman Salas, Secretary, FCC, at 3 item 4 (Dec. 21, 2001).

[109] *Reallocation Order*, Appendix C at 46.

We also support the Commission's proposal that, subject to appropriate predefined coordination procedures, geographic area licensees should be responsible for determining whether a change or addition to their deployment necessitates a coordination procedure with other services.[110]

ArrayComm agrees that protection should be afforded to the Greenbelt METSAT site only during periods when it is in use, and that commercial operations in its vicinity should be otherwise allowed to exceed any special protection criteria for that site.[111] We also believe that the general coordination procedures specified for the Wallops Island and Fairbanks sites are applicable[112] with the following two provisos. First, as mentioned above, a single coordination procedure encompassing multiple fixed and mobile commercial stations should be available. Second, we propose that the Commission adopt the proposed coordination procedure jointly developed by NOAA and ArrayComm.[113]

VII. The Commission Should Adopt Its Proposed Bidding Credits For Small Business Applicants In The 1670-1675 MHz Band

A. The Commission's Proposed Small Business Bidding Credits Are Sufficient to Ensure that New Companies Have a Meaningful Opportunity to Compete for Licenses in the 1670-1675 MHz Band

The Commission seeks comment on its proposed two-tiered system of bidding credits for the auction of the 1670-1675 MHz band: an "entrepreneur" credit of 15% for entities with $40 million or less in revenue for the preceding three-year period; and a "small business" credit of 25% for entities with $15 million or less in revenue for the preceding three-year period.[114] This

[110] *Reallocation NPRM* ¶128.

[111] *Reallocation NPRM* ¶133.

[112] *Reallocation NPRM* ¶132.

[113] *Reallocation NPRM* ¶134-135.

[114] *Reallocation NPRM* ¶¶ 146, 148.

two-tiered structure provides an appropriate competitive bidding scheme that will allow new companies offering innovative services a meaningful opportunity to bid for licenses in this band, as Congress has mandated.

One of Congress's express requirements when it authorized the use of competitive bidding was that the Commission must "disseminat[e] licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women."[115] The Commission implemented this requirement in 1997 by establishing a tiered system of "designated entities" that warrant preferential treatment in competitive bidding;[116] it defines designated entities in terms of average gross revenues.[117] The Commission thus created a three-tiered scheme for designated entities that are entitled to bidding credits on a sliding scale.[118] The *Reallocation NPRM* largely follows this three-tiered system for the 1670-1675 MHz band.[119]

The proposed bidding credits of $40 million/15% and $15 million/25% are an appropriate application of the Commission's Part 1 designated entity scheme. These credits provide an adequate level of protection to small businesses from being prejudiced in the upcoming auction as against larger, well-established participants. At the same time, these credits ensure that the company that is awarded the license has the financial capability of satisfying the Commission's

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[115] 47 U.S.C. § 303(j)(3)(B).

[116] *Amendment of Part I of the Commission's Rules – Competitive Bidding Procedures*, WT Docket No. 97-82, Third Report and Order, FCC 97-413, 13 FCC Rcd. 374 (1997) ("*Part 1 Third Report and Order*").

[117] *Part 1 Third Report and Order*, 13 FCC Rcd. at 388.

[118] *Part 1 Third Report and Order*, 13 FCC Rcd. at 404.

[119] *Reallocation NPRM* ¶ 146.

renewal expectancy and performance requirements.[120] The Commission should therefore adopt its proposed two-tiered bidding credits structure.

B. The Proposed Public Safety Bidding Credit Is Not Appropriate for the 1670-1675 MHz Band

The Commission also seeks comment on the proposed public safety bidding credit available to entities that will use this spectrum for a public purpose.[121] Although ArrayComm strongly supports the use of spectrum for a public good, including public safety, it believes that this type of credit is inappropriate for the 1670-1675 MHz band, as it would favor an exclusive public safety use of this spectrum rather than encouraging free development of innovative value-added services. As an initial matter, ArrayComm notes that public safety spectrum uses are not subject to competitive bidding under Section 1.2101(b) of the Commission's rules.[122] Because the Commission has designated the 1670-1675 MHz band for commercial use, it has already determined that auctioning the spectrum is indeed appropriate. It would be anomalous to adopt public safety bidding credits for a band with a commercial use designation.[123]

A public safety bidding credit would unfairly prejudice certain participants in the auction, such as ArrayComm, who have developed or intend to develop public safety applications for the 1670-1675 MHz band. MicroTrax has requested that a specific additional bidding credit be provided to entities that will use the spectrum, at least in part, for a public purpose, for example, MicroTrax's proposed Personal Location and Monitoring Service (PLMS).[124] ArrayComm

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[120] ArrayComm recommends that the Commission adopt the substantial service test for each of these requirements. *See* Sections III.C and IV, *supra*.

[121] *Reallocation NPRM* ¶¶ 151-152.

[122] 47 C.F.R. § 1.2101(b). *See also* 47 U.S.C. § 309(j)(2) (permitting the Commission to set for auction spectrum for which the licensee is reasonably likely to "receiv[e] compensation from subscribers").

[123] *See* MicroTrax ET 00-221 Comments at iii-iv; 12-17.

[124] MicroTrax ET 00-221 Comments at 18. *See also Reallocation NPRM* ¶ 151.

supports the goal of encouraging spectrum use for public safety, as such applications are in keeping with the overall purpose of licensing the public radio spectrum. To provide a special, additional bidding credit to entities that claim to provide a public safety service, however, would limit the spectrum's utilization in contravention of Congress's express goals. This credit would seem to sanction, and even encourage, a reversion to a quasi-government use of this band, rather than "promot[e] the development of new technologies, products and services."[125]

In addition, applying a public safety bidding credit would prejudice applicants that have also developed applications for public use. ArrayComm's proposed *i-BURST* service has substantial public safety applications that ArrayComm intends to implement. ArrayComm's network will have the capacity to meet the needs of public safety entities as well as providing service to the general public. It would be extremely unfair if the applicant seeking a public safety credit on the basis that its network will be used for public safety applications won the auction based on its deeper credit and defined its eligibility for its public safety service offerings so broadly as to include virtually everyone, or sold its excess network capacity to others for commercial use. To provide a bidder a special bidding credit to the exclusion of other applicants would unfairly increase their ability to obtain a license. Moreover, to construct such a skewed competitive structure contravenes Congress's initial purpose of ensuring a truly free, unencumbered market for public spectrum.[126]

Finally, a public use bidding credit could unnecessarily complicate the Commission's heretofore transparent designated entity bidding credit structure. A public use bidding credit is

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[125] House Report, 103rd Cong., 1st Sess. at 246.

[126] "The bill requires the Commission to establish a competitive bidding methodology promoting the development of new technologies, products and services, and which efficiently utilizes the spectrum for the benefit of the public." House Report, 103rd Cong., 1st Sess. at 246.

an unwieldy mechanism to use in the 1670-1675 MHz mixed use environment. Because there are other entities that will use this spectrum in part for a public purpose, it would be extremely difficult to gauge the appropriate level of credit for each entity. Moreover, ArrayComm wishes to emphasize that, as commenters on this spectrum have already demonstrated, such bidding credits are unnecessary to ensure public use of the 1670-1675 MHz band, as multiple providers have already indicated their intent to adopt a mixed use service plan.

For these reasons, the Commission should consider the proposed public safety bidding credit cautiously to ensure nondiscriminatory application and in the broader context of auction administrability.

VIII. Conclusion

ArrayComm commends the Commission for the vision it has shown by quickly implementing this rulemaking proceeding to put an additional 27 megahertz of spectrum to its most efficient use. ArrayComm strongly urges the Commission to continue in its efforts to spur the rapid deployment of innovative wireless services by adopting its proposed licensing plan for the 1670-1675 band. Key aspects of the Commission's plan include application of Part 27 rules, nationwide licensing, and making the full 5 MHz available as a single block.

The Commission's proposed application, ownership and license terms will also accelerate the deployment of innovative services. Permitting both commercial and private use of the spectrum, as well as broad applicant eligibility and forbearance from Title II requirements will allow service providers the commercial flexibility they will need to provide a wide variety of next-generation services to the public. In addition, the proposed 10-year license term with substantial service renewal contingency provides crucial stability that will encourage investment.

ArrayComm further urges the Commission to adopt technical rules and coordination procedures that are sufficient to avoid interference while not hindering the ability of licensees to offer innovative services. In-band and out-of-band rules must be formulated independently, and the operator must be given the freedom to determine how to meet out-of-band objectives. These rules are so fundamental to shaping the utility of the spectrum that, particularly with respect to the designation of protected adjacent band services, they must be determined clearly and specifically well in advance of the auction in order to give applicants fair opportunity to seek auction financing. By promptly adopting specific and clear rules that do not incorporate assumptions regarding eventual commercial technologies, the Commission can ensure maximum participation in the forthcoming auction and the most efficient use of the 1670-1675 MHz by subsequent licensees.

Respectfully submitted,

ARRAYCOMM, INC.

By: _____

Danny E. Adams
Paul G. Madison
Joan M. Griffin
Stephanie A. Joyce
KELLEY DRYE & WARREN LLP
1200 19th Street, N.W., 5th Floor
Washington, DC 20036
Telephone: (202) 955-9600
Facsimile: (202) 955-9792

Attorneys for ArrayComm, Inc.

Bradley P. Holmes
Senior VP, Regulatory and Government Affairs

Randall Coleman
VP, Regulatory Affairs

Leonard S. Kolsky
LUKAS NACE GUTIERREZ & SACHS
1111 19th Street, N.W.
Washington, D.C. 20036
Of Counsel

Marc Goldburg
CTO, Internet Products Group

ARRAYCOMM, INC.
888 Sixteenth Street, N.W., Suite 700
Washington, D.C. 20006

March 4, 2002

CERTIFICATE OF SERVICE

I, Stephanie A. Joyce, certify that on this 4th day of March, 2002, a true and correct copy of the foregoing Comments of ArrayComm, Inc. were served via courier or First Class Mail* on the following persons:

_____
Stephanie A. Joyce

William F. Caton
Acting Secretary
Federal Communications Commission
445 12th Street, S.W.
Room TW-A225
Washington, D.C. 20054

Chairman Michael Powell
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20054

Peter Tenhula
Office of Chairman Powell
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20054

Commissioner Kathleen Abernathy
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20054

Bryan Tramont
Office of Commissioner Abernathy
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Michael Copps
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Paul Margie
Office of Commissioner Copps
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Commissioner Kevin Martin
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Monica Desai
Office of Commissioner Martin
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Edmund Thomas
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Paul Kolodzy
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Julius Knapp
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Bruce Franca
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
Room 7-C153
Washington, D.C. 20554

Lisa Gaisford
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Ira Keltz
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Thomas Sugrue
Chief, Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Kathleen Ham
Deputy Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Margie Wiener
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Zenji Nakazawa
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20054

Nese Guendelsberger
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20054

Brian Marenco
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Kelly Quinn
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Tim Maguire
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

* Gregg P. Skall
Pepper & Corazzini, L.L.P.
1776 K Street, N.W.
Suite 200
Washington, D.C. 20006
Counsel for MicroTrax

* Mitchell Lazarus
Fletcher, Heald & Hildreth, P.L.C.
1300 North 17th Street, 11th Floor
Arlington, VA 22209
Counsel for AeroAstro

Qualex International
445 12th Street, S.W.
Room CY-B402
Washington, D.C. 20554